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Effects of low frequency electromagnetic fields on growth, total antioxidant activity and morphology of the intestine in rainbow trout (Oncorhynchus mykiss)

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Keywords

extremely low-frequency electromagnetic field, rainbow trout, growth performance, serum antioxidant power, gastrointestinal structure

Abstract

For many years it was believed that extremely low-frequency electromagnetic field (ELF-EMF) do not have any significant biological effects. In this study, the influence of extremely low-frequency electromagnetic fields on the growth performance, serum antioxidant power and gastrointestinal structure of rainbow trout were evaluated. Rainbow trout (17-18 g) were exposed to electromagnetic fields (15 Hz) at the range of 1 h daily and 0.01, 0.1, 0.5, 5 and 50 μT, for a period of 60 days. Growth performance of the trout improved in different treatment groups especially at 0.1, 0.5, 5 and 50 μT. Serum total antioxidant activity was significantly enhanced with different doses of electromagnetic induction at 0.5, 5 and 50 μT. Meanwhile, higher density of goblet cells per villus in fish intestines and pyloric caeca at 0.5 μT induction was observed. These results indicate that application of extremely low-frequency electromagnetic fields with a frequency of 15 Hz and induction of more than 0.5 μT might improve the growth performance, total antioxidant power and gastrointestinal structure in rainbow trout.

Abbreviations

Hz: Hertz
μT: Microtesla
ELF-EMF: Extremely Low Frequency Electromagnetic Field
LF-EMF: Low Frequency Electromagnetic Field
SGR: Specific Growth Rate
FCR: Feed Conversion Ratio
FRAP: Reducing Ability of Plasma
MDA: Malondialdehyde
IGF-1: Insulin-like Growth Factor 1
SOD: Superoxide Dismutase

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